U.S. Cellular Corporation 36-Month Progress Report for Indoor 911 Location Accuracy
PS Docket NO. 07-114
August 3, 2018

I. INTRODUCTION

Pursuant to the Federal Communications Commission ("FCC")'s E911 Fourth Report and Order, U.S. Cellular Corporation ("USCC") submits its 36-Month Progress Report for Indoor 911 Location Accuracy (§20.18(i)(4)(ii). Previously, on June 4, 2018, USCC submitted its Compliance Certification satisfying the requirement of 47 C.F.R. § 20.18(i)(2)(i)(B)) for reporting of 50-meter horizontal accuracy or providing Dispatchable Location for 50 percent of all wireless 911 calls by April 3, 2018. USCC has filed all required benchmark and progress reports, and continues to fulfill its Indoor 911 Location commitments as detailed in this report.

II. STRATEGY FOR HORIZONTAL REQUIREMENTS

Under the FCC rules, non-nationwide wireless carriers are required to deliver either a Dispatchable Location or X/Y location information to 911 within 50 meters (*See* FCC, Fourth Report & Order on Wireless E911 Location Accuracy Requirements (rel. Feb. 3, 2015)), Section 20.18(i)(2)). Dispatchable Location solutions provide the verified street address plus additional location information from the planned National Emergency Address Database ("NEAD") that will help locate, with increased accuracy, a wireless device placing a call to 911. By developing Dispatchable Location solutions, wireless providers are leveraging evolving wireless technologies, such as WiFi and Bluetooth, to help improve the ability of first responders to efficiently and safely respond to wireless 911 callers that may be located within indoor environments.

As initially emphasized in USCC's 2017 combined Implementation Plan and Progress Report, USCC has undertaken considerable efforts toward enhancing emergency location accuracy across its legacy network (i.e., 3G CDMA) to ensure compliance with 911 location accuracy benchmarks. Further improvements also continue for newer network technologies, such as 4G LTE, to achieve refined location accuracy and to support Dispatchable Location.

A. Tools and Testing

USCC procured and routinely utilizes a sophisticated location performance management tool that supports performance monitoring of live 911 calls and analysis of archived 911 data traffic. This tool enhances visibility into potential areas of emergency network services optimization and provides detailed reporting to comply with the Fourth Report & Order requirements. Furthermore, the tool is fully equipped to monitor yield and location estimates in accordance with FCC and Public Safety expectations.

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USCC conducted key optimization efforts across: 1) its base-station almanac (BSA) database, 2) location platform data-fill [specific to the maximum antenna radius (MAR)], and 3) cellsite positioning that collectively helped promote increased accuracy levels across its existing (CDMA) network platform. USCC is also conducting periodic network location accuracy drive testing to help maintain visibility into its emergency services 911 operations and to guide network optimization efforts. This resource intensive drive testing provides a practical snapshot of 911 call flows and location results and identifies areas of needed emergency services location enhancement, serving as a baseline for 911 monitoring and performance.

All existing location methods (i.e., position sources) used across USCC's commercial network have been fully-tested and vetted as proven technologies in the CTIA Test Bed. The emergency services available include LTE/VoLTE related location technologies, such as AGNSS, Hybrid Location Methods, and OTDOA. USCC remains receptive to deploying emergency services location technologies uncovered through the Test Bed.

USCC is deploying handsets that are vetted for location accuracy improvements and tested and certified according to industry standards and approved technical benchmarks. USCC requires its device OEMs to provide validation that their handset portfolio offerings have features promoting enhanced location accuracy improvements.

B. National Emergency Address Database

USCC helps govern NEAD activity and progress by maintaining an active presence on the NEAD and Test Bed LLC Steering Committees as well as the Test Bed TAC. USCC Regulatory and Technical Staff house regularly scheduled calls with the NEAD LLC about USCC's intention to participate in the NEAD platform and provide its customers and consumers with the advantages of Dispatchable Location. The NEAD LLC's Terms of Use (ToU) Agreement is under active review regarding USCC's production use of the NEAD and service support for 911 calls. USCC Engineering continues to incorporate recent ATIS and 3GPP-related standards (including LPPe) across its core network, in the location platform, and in future handset portfolios.

C. Device-Based Hybrid (DBH) and Small Cells

USCC continues to conduct extensive research into Mobile Station Based (MSB) and Mobile Station Assisted (MSA) methods of device-based hybrid technology solutions. Recent indoor and outdoor testing was performed to explore the advantages and limitations of DBH solutions concerning 911 service support. Concentration was put on analyzing and validating improvements to initial location time-to-first-fixes (TTFF) and identifying key technological elements that promote improved location accuracy.

A diverse array of small cells remains an integral component of USCC's network implementation plans. Implementation and testing provisions are underway to achieve an E911 solution that will include Dispatchable Location from emergency call originations on indoor enterprise small cells. The solution is intended to enable customers and consumers in various indoor settings, where enterprise small cells have been deployed (e.g.,

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business offices, retail stores, other high population traffic areas, etc.), to have refined 911 emergency service access, including the availability of Dispatchable Location, within those indoor venues.

III. STRATEGY FOR VERTICAL REQUIREMENTS

The Test Bed LLC is formulating, upon final review of vertical solutions, Z-Axis recommended technical requirements. USCC recognizes that additional questions and further research remains from the Test Bed's Stage-Z testing in order to finalize a Z-Axis location metric recommendation. The Test Bed's decision on the appropriate metric for vertical location accuracy is anticipated by the latter half of 2018. USCC understands that upon FCC approval, this vertical location metric will become the second option to fulfill vertical requirements (i.e., either (1) dispatchable location, or (2) z-axis technology achieving Commission-approved z-axis metric in each of the top 25 CMAs by 2022 and 50 CMAs by 2024 for non-nationwide carriers).

A. Uncompensated Barometric Pressure Data

USCC recently implemented network enhancements to support Public Safety with uncompensated barometric pressure data. As previously mentioned, project efforts to incorporate LPPe on the control-plane side of the core network is in-progress. USCC has a dedicated project team developing network architecture and performing functional testing from test handsets to the location platform to ensure the relay/routing of any upcoming atmospheric pressure information to the designated PSAPs. USCC's Device Engineering Team enacted requirements for handset OEMs to make uncompensated barometric pressure information retrievable to the core network.

B. Dispatchable Location and Z-Axis Roadmap

Initial CMA reference point data was submitted to the NEAD LLC for testing purposes. This reference point information of WiFi Access Point MAC addresses might serve as accessible data to support Dispatchable Location on the forthcoming NEAD production platform serving USCC and all participating users. The reference point information contains suite and floor level descriptions of itemized civic addresses where available within USCC's network. USCC is still exploring whether it can support enhanced and continual reference point data submittals to support the NEAD, and is working in conjunction with the NEAD LLC on expectations for long-term data-fill.

CONCLUSION

USCC continues to take its commitment to public safety seriously and treats a 911 call as the most important call its customers can make. To that end, USCC has been and continues to be actively involved in the planning and implementation of improved 911 indoor location accuracy for emergency services.

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